Institution: IDI
Administrative unit: SE-LT
Title of case study: Kahoot!
Period when the underpinning research was undertaken: 2006 - 2021
Period when staff involved in the underpinning research were employed by the submitting institution: 2006-2021
Period when the impact occurred: 2014-2023

1. Summary of the impact

Kahoot! is a game-based learning platform that aims to empower everyone, including children, students, and employees, to unlock their full learning potential. The technology is based on research conducted by Kahoot! co-founder Morten Versvik and Professor Alf Inge Wang. The work started from a game concept developed by Wang and then further developed in the context of Versvik's Master's degree at NTNU. Kahoot! utilizes state of the art game technology, and, motivational and social theories of learning. Kahoot! has hosted over 9 billion participants in hundreds of millions of learning sessions since it is launched in 2013.

2. Underpinning research

The game concept used in Kahoot! started out as an idea of Professor Alf Inge Wang in 2006. In collaboration with master students, multiple prototypes were developed and tested in experiments. The idea was to transform the classroom into a gameshow, where the teacher acted as the game show host, and the students were contenders, using their own mobile devices. The initial prototype was named Lecture Quiz. From 2006 to 2011, four versions of Lecture Quiz were developed at NTNU, mainly improving usability – making it easier to create quizzes, and technical improvement using newer technology for implementation (hardware and software).

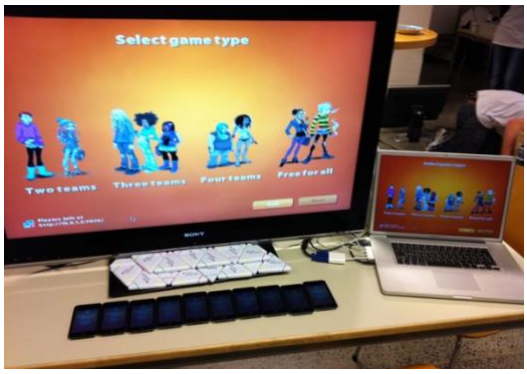

Figure 1. Evaluation of a Lecture Quiz! prototype at NTNU.

Kahoot! was founded in 2012 (launched 2013) by IDI's master students Morten Versvik, Johan Brand, and Jamie Brooker, together with Professor Alf Inge Wang, and were later joined by entrepreneur Åsmund Furuseth.

Since Kahoot! was launched and funded by the Research Council of Norway, the research experiments intensified. Lead by Prof. Wang a series of studies were conducted related to the effects of using the game-based learning platform in classrooms. For instance, a quasi-experiment conducted at NTNU with 252 students participating investigated the wear-out effect of Kahoot!, by comparing students' perception of the system after playing once, vs. playing frequently over five months (Wang, 2015). The results indicated that Kahoot! managed to boost students' engagement, motivation, concentration, and learning after using it repeatedly for five months. The core factor to keep students' attention after heavy repeated usage was found to be the competitive nature of Kahoot!.

In a follow up study, Wang et al., (2016) investigate how Kahoot! performs compared to other tools and platforms. In a quasi-experiment with 384 students at the NTNU, Kahoot! was compared to

using a paper quiz and a simple polling system. The results show statistically significant improvement in motivation, engagement, enjoyment, and concentration for the gamified approach (Kahoot!) compared to the two others.

In another quasi-experiment (Wang & Lieberoth, 2016) where 593 students participated, the authors investigated how the use of points and audio in Kahoot! affects concentration, engagement, enjoyment, learning, motivation, and classroom dynamics. The results reveal that there are some significant differences whether audio and points are used in the areas of concentration, engagement, enjoyment, and motivation. The worst result was for the case where both audio and points were turned off. The most surprising finding was how classroom dynamics was positively affected by the use of audio.

During the last years, Prof. Wang together with his PhD student (Tahir) they published a literature review containing 93 studies on the effect of using Kahoot! (Wang & Tahir, 2020). This paper was published in the leading journal in the area of learning technologies (Computers & Education) and has been the most cited paper of the journal (over 800 citations after 3 years). This is the first literature review that investigates most published studies (experiments, case studies, surveys, etc.) on how using Kahoot! affects learning in the classroom. The main conclusion is that Kahoot! has a positive effect on learning performance, classroom dynamics, attitudes, and anxiety.

3. References to the research

Our work with Kahoot! has directly led to several high-impact publications in top-tier venues such as the Computers and Education (the premier journal in the field of learning technologies):

Wang, A.I. (2015). The wear out effect of a game-based student response system". Computers & Education. 82: 217–227. https://doi.org/10.1016/j.compedu.2014.11.004 **(810 citations)**

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning–A literature review. Computers & Education, 149, 103818. https://doi.org/10.1016/j.compedu.2020.103818 **(890 citations)**

Wang, A. I., Zhu, M., & Sætre, R. (2016). The effect of digitizing and gamifying quizzing in classrooms. Proceedings of the European conference on games-based learning. https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2426374 **(140 citations)**

Wang, A. I., & Lieberoth, A. (2016). The effect of points and audio on concentration, engagement, enjoyment, learning, motivation, and classroom dynamics using Kahoot. In European conference on games based learning (Vol. 20, pp. 738-746). https://www.proquest.com/docview/1859715026?pq-origsite=gscholar&fromopenview=true **(408 citations)**

Nuci, K. P., **Tahir, R., Wang, A. I.,** & Imran, A. S. (2021). Game-based digital quiz as a tool for improving students' engagement and learning in online lectures. *IEEE Access*, *9*, 91220-91234. https://ieeexplore.ieee.org/abstract/document/9452076 **(32 citations)**

In total there are more than 2250 citations (per Jan. 2024)

Besides high-impact publications in top-tier venues, prof. Wang has also been invited to give keynoted in prestigious game and learning technology conferences, such as:

- International Conference on Entertainment Computing (IFIP-ICEC 2015)
- European Conference on Games Based Learning (ECGBL 2015)
- ACM conference on Interaction Design and Children (IDC 2018)
- Norwegian Conference on ICT (NIKT 2019)

- Serious Games Society Conference (GALA 2023)

4. Details of the impact

Based on recent data (see: https://kahoot.com/company/), Kahoot! has hosted over 9 billion participants in hundreds of millions of learning sessions since its launch in 2013. It has been played in all countries in the world with more than 100M Kahoots!. Kahoot! is used in many institutions of higher education around the world, including 97% of the global top 500 universities. Also, half of US teachers and students have hosted or played a Kahoot! in the last year. 97% of Fortune 500 companies are using Kahoot! for training, presentations, onboarding, events and more. Kahoot! offers a free version, and also has 1.37M paid subscribers.

Figure 2. Kahoot! used in a US school (half US teachers used Kahoot! during the last year).

In 2017, Kahoot! had raised $26.5 million in funding from Northzone, Creandum and Microsoft Ventures. On October 11, 2018, Kahoot! was valued at $300 million. As of 11 June 2020, Kahoot! was valued at $1.5 billion and raised further capital from Northzone. In March 2021, the company went public on the Oslo stock exchange.

Today, Kahoot! is a company with an international team of more than 500 employees located at some of the most exciting tech hubs in the world. Kahoot! is also a big international brand and was in January 2023 ranked #3 coolest brand among European Millenials and Gen Z'ers according to YPulse's brand data tracker (above brands like Apple, Coke, TikTok and Instagram). Kahoot! has also generated many thousand media coverages nationally and internationally. Further, Kahoot! has resulted in many prices, including Teknologibragden 2014, Innovasjonsprisen Innovator 14, Digital Service that Changes the World 2014, Noodle Best Online Educational Tool 2015, 2015 EDTECH 20 Winners, Oslo Innovation Award 2016, the Europas Award – "Hottest Education Startup 2017", Product or Service Edtech award 2018, and the 2023 Merit Awards for Technology in the category education.

5. Sources to corroborate the impact

Most of the information behind the creation of Kahoot! can be found in Kahoot!'s about us section and Wikipedia page.

Moreover, Kahoot!'s story has also featured in the news, below are some examples:

- The New York Times: https://www.nytimes.com/2016/04/17/technology/kahoot-app-brings-urgency-of-a-quiz-show-to-the-classroom.html
- CNBC: https://www.cnbc.com/2021/11/02/kahoot-how-a-student-professor-duo-launched-a-5point7-billion-tech-idea.html
- The PC Magazine: https://uk.pcmag.com/education-reference/128455/the-best-online-learning-services-for-2020